

REMARKS

Claims 9, 21, 22, 30, 31 and 32 stand rejected under 35 U.S.C. 112. The Examiner has taken issue with the phrase “combination thereof” in claim 9 and “needed” in claim 30.

Claim 9 is amended deleting the reference the “combination thereof”. Claims 21 and 22 are canceled. Claim 30 is amended deleting the phrase “needed”. Claims 31 and 32 are canceled. The 112 rejections are respectfully overcome.

The Examiner has rejected claims 1, 20, 23, 24, 30, 33 and 34 under 35 U.S.C. 103(a) as being unpatentable over Holtrop (U.S. Patent 4,529,641) in view of Breezer (U.S. Patent 5,635,129), Byma (U.S. Patent 6322658), Steward (U.S. Patent 4211590), Haardt (U.S. Patent 5,180,628), Timothy (U.S. Patent 5775726), and Corpe (U.S. Patent 5,795,015). Regarding claim 1, Holtrop teaches a thermoforming process for a headliner. Examiner admits that Holtrop is silent to, a) an oven for heating the first and second sheets to predetermined temperatures, b) frames holding the first and second sheets, c) thermoforming the first and second sheets onto half molds prior to fusing regions of the headliner parts, d) the interior compartment having impact cushioning, e) ejecting the unified part, f) trimming the unified part, and g) finishing the unified part.

Claim 1 is currently amended to incorporate dependent claim 8. Claim 8 is now canceled. The remarks are directed at amended claim 1, and in subsequent remarks address the examiner’s rejections for claim 8. Applicant claims vacuum thermoforming one sheet and then a second sheet, and then compression molding the two parts. Holtrop teaches, col. 4, line 51–col. 5, line 5, “To effect twin-sheet thermoforming two layers of foamed thermoplastic sheet are arranged with *a coating of polymer-impregnated fabric on at least the outer surfaces and with adhesive in a registration pattern on the inner surface of at least one layer*. At least one blow pin is inserted between the layers, preferably at a location devoid of adhesive to facilitate later removal of the blow pin. The layer can be heated to soften the adhesive prior to lamination in a press. The laminated layers are then

preheated to soften the foamed thermoplastic material and the polymer-impregnated in the fabric coating. *The preheated laminate is then inserted into a thermoformer where a source of pressured gas, for instance air, is connected to the blow pin and mold blocks close on to those portions of the laminate to be adhered between the two layers of foamed thermoplastic. The mold can shape the laminate into a three-dimensional shape which is hollow at certain locations within its periphery, as illustrated in the cross-sectional view of FIG. 2.*"

As amended, claim 1 has a step for combining a cover stock material with a thermoplastic sheet using compression molding having matched halves forming a covered first part; a second step for vacuum thermoforming a second sheet forming a second part; and a third step for combining fusing the first and second parts using compression molding. In contrast to Applicants' process, Holtrop teaches pressure gas thermoforming fabric coated foam sheets, and then adhering portions of the fabric coated foam sheets. Holtrop does not teach compression molding to form a thermoplastic first sheet coated with a fabric in a match half mold, nor does he teach that heat and compression can be used to fuse the first and second. Applicants' invention does not employ pressurized air.

Applicants' invention has advantages over Holtrop in that Applicants' process can produce a covered unified part that can be open on the edges, whereas Holtrop relies on pressurized air, and only laminates that are sealed and can be pressurized. Applicants' process has a lot more flexibility in shaping the unified part than the process as taught by Holtrop. Applicants' claim 1 is not anticipated by Holtrop.

Examiner has stated that a) Byrna teaches an oven (3:66) for heating a first and second sheet to predetermined temperatures (FIG. 4) for thermoforming headliner parts to obtain optimal compression and bonding of the layers (2:1-4).

In contrast to Byrna, Applicants teach a stepwise process where compression molding using matched halves, vacuum thermoforming, and compression molding are all

combined in one process. Byma teaches in col. 4, lines 8 –12, that the cover member 22 is simultaneously combined with the inner layer and the reinforcing layers. Using Byma, it would be impossible to form a “covered unified part having at least one interior compartment having head impact cushioning”, which is an essential feature of the applicants’ invention.

Examiner states that b) Steward teaches (6:40-49) use of tenter frames during a preheating step prior to thermoforming a headliner to avoid shrinkage and surface irregularities.

Applicants teach the use of tenters to build up the covered first part by using the tenter to add non heated cover stock. Steward does not teach transferring cover stock to a compression mold. Also, Steward does not teach the claimed use of a frame as a conveyor of product to the mold.

Examiner states that c) Breezer teaches a thermoform process to form thermoformed articles with portions of significantly greater thickness than the combined thicknesses of the sheets from which the article is formed (2:35-39) comprising the steps of: holding a first sheet along its edges (FIG. 6, Item 34); heating the first sheet (3:39-41); transferring and molding the first sheet onto a half mold of a vacuum thermoforming mold forming a first part (3:38-47); holding a second sheet along its edges (FIG. 6, Item 30); heating the second sheet (3:49); transferring and molding the second sheet onto an opposing half mold of the vacuum thermoforming mold forming a second part (3:48-50); compressing the half molds of the thermoforming mold fusing regions of the first part to the second part (3:50-54), thereby forming a unified part having at least one interior compartment (FIG. 6).

Claim 1 (amended) claims “a covered unified part having at least one interior compartment having impact cushioning”. Breezer does not teach using a mold to form a covered first part using compression molding (col. 3, line 50 states “drawn into a second

vacuum mold”). Also, Breezer does not teach forming a cavity except as a means of adding reinforcing thermoplastic material 48. In col. 5, lines 28–31 reads, “To achieve reinforcement a quantity of heated liquid thermoplastic material 48 is injected under pressure into the cavity 50 between the first and second sheet by an injector inserted through passage 51.” Breezer does not teach a headliner, nor the more general concept of twin sheets with a cavity within. Breezer’s invention addresses the issue of thin points formed during vacuum thermoforming that may need reinforcement, col. 4, lines 39-33. Breezer does not teach the use of a tenter to convey cover stock material, nor a covered first part to another mold, nor a tenter to convey a second sheet to the top half of the mold. Breezer teaches away from a headliner having head impact cushioning, as Breezer’s cavity is filled with resin.

Examiner states that Timothy teaches a roof-mounted airbag. In view of the interior cavities of Timothy, interior cavities would be obvious to one of ordinary skill.

Applicants take exception to the Examiner’s rejection that the “use of interior cavities provide impact cushioning for a head” is obvious. For instance, in U.S. Patent 5,348,798 to Berghuis et al., Berghuis et al. teach an automobile bumper formed from moldable plastic sheets having a cavity that is formed when ice 26 melts. A bumper, even one with a cavity, does not provide head impact cushioning. An air bag, as taught by Timothy in U.S. Patent 5,775,726 in col. 2, line 11, teaches “an inflatable cushion”. In the instant application the interior compartment having head impact cushioning is not pressurized, nor does it have an inflating gas as taught by Timothy in col. 2, line 16. The thermoformed laminate taught by Holtrop is a laminate of foam sheets, which provides improved acoustic properties, col. 5, line 25. The Holtrop laminate is substantially a corrugated part, where the corrugations impart strength to the laminate. As pointed out in col. 5, line 24-28, of Holtrop, “the headliner is hollow in the locations between roof support ribs and formed to closely conform to the interior surface of the automobile.” The Examiner’s analysis does not match the stated purpose of the hollow cavities. The rejections based on Timothy and Holtrop are respectfully overcome.

The Examiner cites e) Haardt, who teaches ejecting a composite laminate part (4:55-56).

Applicants teach ejecting a covered unified part formed by vacuum forming and compression, where the covered unified part has at least one interior compartment having head impact cushioning. Haardt teaches a foam filled laminate that is hot molded, and then cooled. Applicants' process does not claim an ejector, but the process of ejecting.

The Examiner cites f) Corpe, who teaches (6:44-49) trimming.

The Examiner cites g) Breezer and Holtrop as teaching the step of Finishing

Claim 1 is amended deleting steps of trimming and finishing. These steps are now in claim 30, which is a dependent claim depending on claim 1. Applicants teach trimming, as shown particularly in FIGS. 4-6, and finishing are a part of the work flow. Trimming is a lot easier when the unified part is still warm. Neither Corpe, nor Breezer, nor Holtrop teach secondary operations where the unified part is fresh out of the mold.

As previously stated, claim 1 is amended incorporating claim 8. Claim 8 stands rejected on the grounds that as being unpatentable over Holtrop in view of Byma, Steward, Breezer, Haardt, Corpe, Timothy and further in view of Juriga, U.S. Patent 5,549,776. Examiner states that in col. 3, lines 19-20, and col. 6, lines 25-27, Juriga teaches a thermoform process further comprising the steps of: after heating the first sheet in the oven to the pre-determined temperature, transferring the heating first sheet to a thermoforming mold, having matched mold halves, col. 3, line 22 and FIG. 4, item 142 and 144; transferring a cover stock material to the thermoforming mold having matched tabs, col. 4, lines 21-23; compressing and fusing the cover stock material to the first sheet forming a cover first headliner part, col. 6, lines 29-33.

Applicants' claim 1 claims a process where the cover stock material is not preheated prior to being molded. Juriga's patent teaches that all the layers are heated and laminated. See FIG. 4. Juriga's process teaches in col. 6, lines 15 -20, "The scrim laminae 38 and 39, the foamable lamina 36a, and finish lamina 28, and the adhesive webs 40, 41 and 42 positioned between the laminae are laid in place, preferably on a flat supporting surface. The individual laminae are in face-to-face relation, but remain in an unbonded form until they are heated and molded. The unbonded laminate 120 is placed into a hot air recirculated thermoforming oven 130 containing radiant heat sources 132 and 134." The rejection is respectfully overcome.

Claim 1 should be allowed in view of the amendment to claim 1, and the arguments set forth above.

Claims 20, 23, 24, 30, 33, and 34 stand rejected for the reasons cited above.

Claims 20, 23, 24, 30, and 33 are dependent claims, depending on claim 1, and have all the limitations of claim 1. Claim 30, has been amended to address the issue of indefiniteness. Claim 33 teaches the use of a preheat oven to partially warm the first sheet prior to the oven. The Examiner states that Byma teaches a preheat oven in FIG. 4 and (4:59-63). The Examiner is in error. There is only one oven. While Byma teaches an oven, he does not teach a preheat oven prior to the oven. In addition to the limitations of claim 1, claim 33 should be allowed on this additional criteria.

Similarly, for claim 34, which depends on claim 33, the Examiner states that Byma teaches a preheat oven in FIG. 4 and (4:59-63). Claim 34 teaches the use of a preheat oven to partially warm the second sheet prior to the oven. The Examiner states that Byma teaches a preheat oven in FIG. 4 and (4:59-63). Again, the Examiner is in error. There is only one oven. While Byma teaches an oven, he does not teach a preheat oven prior to the oven. In addition to the limitations of claim 1 and claim 33, claim 34 should be allowed on the use of two preheat ovens.

Claims 2 and 3 stand Claims 2 and 3 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Holtrop (USPN 4,529,641) in view of Byma (USPN 6,322,658 B1), Steward (USPN 4,211,590), Breezer (USPN 5,635,129), Haardt (USPN 5,180,628), Corpe (USPN 5,795,015), and Timothy (USPN 5,775,726). Holtrop in view of Byma, Steward, Breezer, Haardt, Corpe, and Timothy teach the subject matter of Claim 1. The Examiner cites Page 3 of Applicant's specification to show that the "first headliner part....is substantially the shape that is visible as seen from inside the vehicle" to distinguish the first sheet of Claim 2 (visible inside vehicle) from the second sheet of Claim 3. As to Claim 2, Holtrop is silent to the first sheet that is a low pressure, thermoformable, thermoplastic composite comprised of polypropylene and long chopped glass fibers. Haardt teaches a first sheet (2:23) that is a low pressure (3:47), thermoformable, thermoplastic composite comprised of polypropylene and reinforcing agents (2:38). Haardt teaches both first and second sheets comprised of polypropylene and reinforcing agents (2:35-39), and long glass fibers (2:59 to 3:6) used as reinforcing agent in the second sheet (3:3), and, therefore, it would have been obvious to one of ordinary skill that long glass fibers also be used as the reinforcement in the first sheet. Although Haardt is silent to the long glass fibers specifically being "chopped," the Examiner takes the position that the long glass fibers are not indefinite in length, and were therefore cut to some length. The Examiner contends it would have been prima facie obvious to one of ordinary skill in the art at the time of the invention to use a first sheet that is a low pressure, thermoformable, thermoplastic composite comprised of polypropylene and long chopped glass fibers given Haardt's teaching that such a sheet has an increased rigidity in the method of Holtrop, Byma, Steward, Breezer, Haardt, Timothy, and Applicant's admission. As to Claim 3, Holtrop is silent to the second sheet that is a low pressure, thermoformable, thermoplastic composite comprised of polypropylene and long chopped glass fibers. Haardt teaches a second sheet that is thermoformable, thermoplastic composite comprised of polypropylene and long glass fibers (2:59 to 3:6). Although Haardt is silent to the second sheet that is "...low pressure, thermoformable," Haardt's teaching that both sheets are comprised of polyethylene and that the first sheet is formed at reduced pressure would make it obvious to one of ordinary skill that the second sheet is also capable of being formed at reduced

pressure and is therefore, "low pressure, thermoformable." Although Haardt is silent to the long glass fibers specifically being "chopped," the Examiner takes the position that the long glass fibers are not indefinite in length, and were therefore cut to some length. It would have been prima facie obvious to one of ordinary skill in the art at the time of the invention to use a second sheet that is a low pressure, thermoformable, thermoplastic composite comprised of polypropylene and long chopped glass fibers, given Haardt's teaching that such a sheet has an increased rigidity, in the method of Holtrop, Byrna, Steward, Breezer, Haardt, Corpe and Timothy.

The Examiner has failed to show that the combination of references teach a substrate that would be suitable for HIC headliners. The references do not teach a flexural modulus range (elasticity) that provides head impact cushioning. The cited ranges in claims 2 and 3 are provided in the specification, and claims 2 and 3 were amended in response to the Examiner's complaint that "low pressure, thermoformable thermoplastic composite" was undefined. The properties of the composite define in part what sheets are suitable for HIC headliners. Claims 2 and 3 are dependent claims that depend on currently amended independent claim 1. Claims 2 and 3 should be allowed.

Claims 4, 5, 6, 7, and 12 stand rejected under 35 U.S.C. 103(a) being unpatentable over Holtrop in view of Byrna, Steward, Breezer, Haardt, Corpe, and Timothy. The Examiner reiterates his basis for rejecting claim 1 and particularly points out that Holtrop teaches a layer fusing adhesive in column 3, lines 59-61, column 4, lines 16-20, and column 4, lines 33-35.

Claims 4, 5, 6, and 7 are dependent claims that cascade to dependent claim 2 and ultimately to independent claim 1 (currently amended). Previous arguments have been presented as to why Applicant's claim 2 should be allowed, as well as currently amended claim 1. As claims 4, 5, 6, and 7 all depend on claims 2 and 1, they have the limitations of claims 2 and 1 and, consequently, the arguments put forth for claims 2 and 1 can be appropriately applied for claims 4, 5, 6, and 7 by their dependency. Claim 7 teaches the

use of a scrim, which is compression heat fused to the second sheet. Holtrop teaches in col. 4, lines 25-30, that, "The laminate structure of this invention is fabricated by preparing two separate layers of foamed thermoplastic material having a coating of a polymer-impregnated fabric adhered to at least one surface." Applicants' are claiming a scrim, not a polymer-impregnated fabric. Holtrop is laminating foams, while Applicants are laminating thermoplastic sheets. A foam will collapse under pressure, while a fiber filled sheet does not. The rejection is respectfully overcome.

Claim 12 is a dependent claim depending on claim 7, and as claim 7 should be allowed, so should the child claim.

Claims 8 -11, 13-16, 21, 25 - 27, 31, and 32 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Holtrop in view of Byman, Steward, Breezer, Haardt, Corpe, Timothy and further in view of Juriga, U.S. Patent 5,549,776. Examiner states that Holtrop teaches heating the first sheet, transferring a cover-stock material to the sheet, compressing with heat and pressure and fusing the cover-stock material to the first sheet forming a covered headliner part; and transferring the covered first headliner part to a second mold and positioning the covered first headliner part in the half mold of the vacuum forming mold (4:1-5:32).

Claim 8 is canceled, and is rolled into claim 1. In any case, Applicants are by the Examiner's rejection. Holtrop teaches in col. 4, lines 16-20, that "The fabric can be laid over the dried polymer emulsion film. The composite of fabric, polymer emulsion film, and foamed thermoplastic sheet can then be laminated by the application of heat and pressure to force the softened polymer film to penetrate the fabric". Applicants do not claim a dried polymer emulsion film. Examiner admits that Holtrop does not teach matched mold halves, which will impart shape to the laminate as well as fuse the components. Holtrop teaches pressurized air thermoforming in col. 4, lines 50-70. Holtrop states, "The layer can be heated to soften the adhesive prior to lamination in a press. The laminated layers are then preheated to soften the foamed thermoplastic material

and the polymer-impregnated in the fabric coating. The preheated laminate is then inserted into a thermoformer where a source of pressured gas, for instance air, is connected to the blow pin and mold blocks close on to those portions of the laminate to be adhered between the two layers of foamed thermoplastic. The mold can shape the laminate into a three-dimensional shape which is hollow at certain locations within its periphery, as illustrated in the cross-sectional view of Fig. 2.” Applicant doesn’t claim pressurized air thermoforming. Claim 1, which now incorporates claim 8, is not anticipated by Holtrop, and the rejection should be withdrawn.

Claim 9 claims, among other materials, leather. None of the cited references teach leather.

Claim 10 teaches an underlayer of foam. Holtrop teaches that the structural layer is foam, and does not teach a foam layer between a thermoplastic sheet and a cover stock material.

Claim 11 is a dependent claim and has all the limitations of claim 1. Claim 13 teaches the addition of a scrim using matched half molds, and as discussed for former claim 8, Applicant doesn’t claim pressurized air thermoforming, nor an polymer-impregnated in the fabric coating, where the coating is a dried polymer emulsion film. Claims 14-16 are dependent claims depending on claims 13, 14, and 15 respectfully, and, as such, have all the limitations of the intervening claims, which ultimately depend on claim 1. Claims 21, 22, 26, 31, and 32 are canceled.

The Examiner has rejected claim 25 on the basis that Holtrop teach injecting foam into the interior compartment, therefore, it would have been *prima facie* obvious to do so to help reduce the severity of head injury to passengers.

Applicants’ claims 25 and 27 claim a headliner that has head impact cushioning. Holtrop does not teach the process of injecting foam into the interior compartment would

help reduce the severity of head injury to passengers. In fact, Holtrop is silent on the purpose of the urethane foam. An equally rational explanation for the foam is that it would improve the stability of the corrugated article formed by Holtrop, as his invention is laminated foam. In any case, the dependent claims 25 and 27 are process claims and Holtrop's disclosure is a compositional invention that does not teach the previously cited method as claimed in claim 1 and intervening claim 13.

Claims 17-19 and 22 stand rejected.

Claims 17-19 and 22 are canceled.

Claim 29 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Holtrop in view of Byma (USPN 6,322,658 B1), Steward (USPN 4,211,590), Breezer (USPN 5,635,129), Haardt (USPN 5,180,628), Corpe (USPN 5,795,015), Juriga (USPN 5,549,776), Timothy, and Strapazzini (USPN 5,529,742).

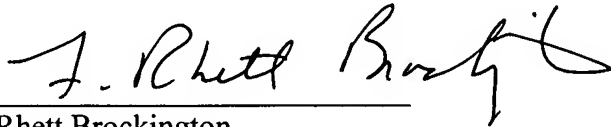
Applicants' claim 29, depending from claim 1, differs from Strapazzini in that Strapazzini does not teach using compression molding to form a covered first part, which is then positioned in a mold with a vacuum formed second part (claim 1), where, prior to forming the covered unified part, positioning wiring, fasteners, duct work, and reinforcing components, and acoustic enhancing materials into what will become the interior compartment with head impact cushioning. Strapazzini does not teach twin sheet thermoforming, and so the reference is only marginally relevant. The Applicants' first part is joined to the second part. Strapazzini does not teach forming a cavity with a covered first part and a second part. Strapazzini teaches that panels can be formed which have channels into which can be placed wires, etc. Applicants' disclose a method for making a headliner having interior compartment that totally encloses wiring, fasteners, duct work and reinforcing components, and acoustic enhancing materials.

Applicants have not added any new claims. Thus, there are no additional fees due.

In view of these Remarks and the Amendment filed herewith, the application is now believed to be in condition for allowance and such favorable action is respectfully requested on behalf of the Applicants.

Respectfully submitted,

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